

REMARKS

Present Status of Application

Claims 1, 3, 5-7, 9 and 11-16 remain pending in the application. The Office Action mailed July 21, 2003, rejected claims 1, 3, 5-7,9 and 11-16 under 35 USC§103(a) as being unpatentable over the prior art disclosed in the instant application (APA) in view of Liu et al. (US Patent No. 6,486,564).

In view of the following discussions, a notice of allowance is respectfully solicited.

Amendment for the drawings

Applicants have amended the drawing figures, to clearly define the features according to the present invention. Submitted for the Examiner's approval are the proposed drawing changes (Figs. 5-7), while the corrections are marked in red ink. Supporting grounds of the amendments for the drawings can be found at least in Figure 8 of the specification. Upon allowance of the application and approval of the drawing changes, revised formal drawings will be submitted in compliance with U.S. Patent and Trademark Office Guidelines.

Entry of this amendment to the drawings is respectfully requested.

Discussion for 35 USC§103 rejections

Claims 1, 3, 5-7, 9 and 11-16 were rejected under 35 USC§103(a) as being unpatentable over the prior art disclosed in the instant application (APA) in view of Liu et al. (US Patent No. 6,486,564).

The previously amended independent claims 1, 7 and 13 have clearly defined the structure and the method according to the present invention. From Figs. 5 & 8, it clearly shows that the ringed projection 243 is a mono-ringed projection, and the outer heat dissipating surface 241 surrounded by the ringed projection is flat. Moreover, the cover 242, the flange 244, the ringed projection 243 and the protrusions 246 are formed into a single body, and are thus an integral indivisible body.

As amended, independent claims 1, 7 and 10 recite respectively:

Claim 1. A packaging structure comprising:
a substrate, having a substrate surface;
a chip, attached onto the substrate surface and electrically connected to the substrate;
a heat slug, attached onto the substrate surface in a manner to cover the chip, the heat slug including an outer heat dissipating surface around which a mono-ringed projection is formed, wherein the heat slug peripherally extends into a flange and the flange, the heat slug and the mono-ringed projection are a single body; and
a molding compound, encapsulating the chip, the substrate surface, and a portion of the heat slug while externally exposing the outer heat dissipating surface of the heat slug.

Claim 7. A heat slug for a packaging structure that is externally encapsulated by means of a molding compound, ***comprising an outer heat dissipating surface around which a mono-ringed projection is formed for preventing the molding compound from covering the outer heat dissipating surface of the heat slug, wherein the heat slug peripherally extends into a flange and the flange, the heat slug and the mono-ringed projection are a single body.***

Claim 13. A method of fabricating a packaging structure provided with a heat slug, the method comprising:
providing a substrate onto which a chip is mounted and electrically connected;
providing a heat slug including an outer heat dissipating surface around which is formed a mono-ringed projection, the heat slug peripherally extending into a flange, wherein the heat slug, the mono-ringed projection and the flange are a single body;

mounting the heat slug onto the substrate via attaching the flange of the heat slug onto the substrate, the heat slug being placed over the substrate in a manner to cover the chip;

mounting the substrate with the heat slug in a mold, the mold including a mold cavity that has an inner surface, the heat slug being received in the mold cavity with the mono-ringed projection of the heat slug tightly abutting against the inner surface of the mold cavity; and

injecting a molding compound into the mold cavity to encapsulate the chip, the substrate surface, and the flange of the heat slug while leaving the outer heat dissipating surface of the heat slug exposed.

(Emphasis added)

Applicant respectfully contends that the structure or the method of the present invention is patentably distinct from the prior art structure. The heat slug in the structure of the present invention includes an outer heat dissipating surface and a mono-ringed projection that is disposed on and surrounds the outer heat dissipating surface. Moreover, the heat slug, the mono-ringed projection and the flange are an integral indivisible body.

The Office Action considered that APA showed substantially the structure of the invention except a ringed projection. The Office Action relied on Liu for teaching the ring projection.

Applicant respectfully traverses this interpretation for at least the following reasons.

Liu simply discloses a heat dissipation module 1 having a base 10, supports 11 and a top plate 12. The top plate 12 preferably has two or more protruding rings 12, as shown in Fig. 1.

In fact, searching through Lu's statements, Liu does not teach or suggest the protruding ring 13 being **formed integrally** on the top plate 12, as asserted by the Office Action. It is unreasonable for the Office Action to interpret Liu's protruding rings 13 as

being integrally formed, in order to be comparable to the ringed projection as claimed in the present invention. Moreover, because Liu emphasized using preferably more than two protruding rings 13 for increasing the heat dissipation area, for one skilled in the art the number of the protruding rings disclosed by Liu should be more than two.

On the contrary, in the present invention discloses using a mono-ringed projection surrounded the outer heat dissipating surface for preventing overflow of the molding compound and the mono-ringed projection and the heat slug are an integral, single body. The heat slug with the mono-ringed projection (together with the substrate) is placed within the mold cavity, and the inner surface of the mold tightly abuts against the mono-ringed projection of the heat slug when the mold is pressed against the substrate surface. Because the mono-ringed projection is used and the contact surface of the only one ringed projection with the inner surface of the mold is relatively small, a tight contact between the outer heat dissipating surface and the inner surface of the mold is attained.

Therefore, Liu fails to remedy the deficiencies of APA, and the combination of Liu and APA fails to teach every feature claimed in the present invention.

As a result, Applicant respectfully submits that independent claims 1, 7 and 13 patentably distinguish over APA and Liu, either alone or in combination. Depend claims are allowable for at least the reasons stated with regard to their respective base claims. Withdrawal of these rejections under 35 USC 103(a) is respectfully requested.

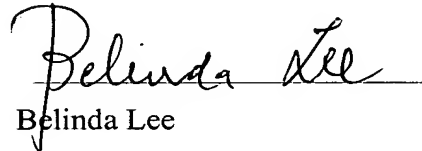
CONCLUSION

In view of the foregoing, it is believed that all pending claims are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

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Respectfully submitted,


Belinda Lee

Registration No.: 46,863

Jianq Chyun Intellectual Property Office
7th Floor-1, No. 100
Roosevelt Road, Section 2
Taipei, 100
Taiwan
Tel: 011-886-2-2369-2800
Fax: 011-886-2-2369-7233
Email: belinda@jcipgroup.com.tw
Usa@jcipgroup.com.tw

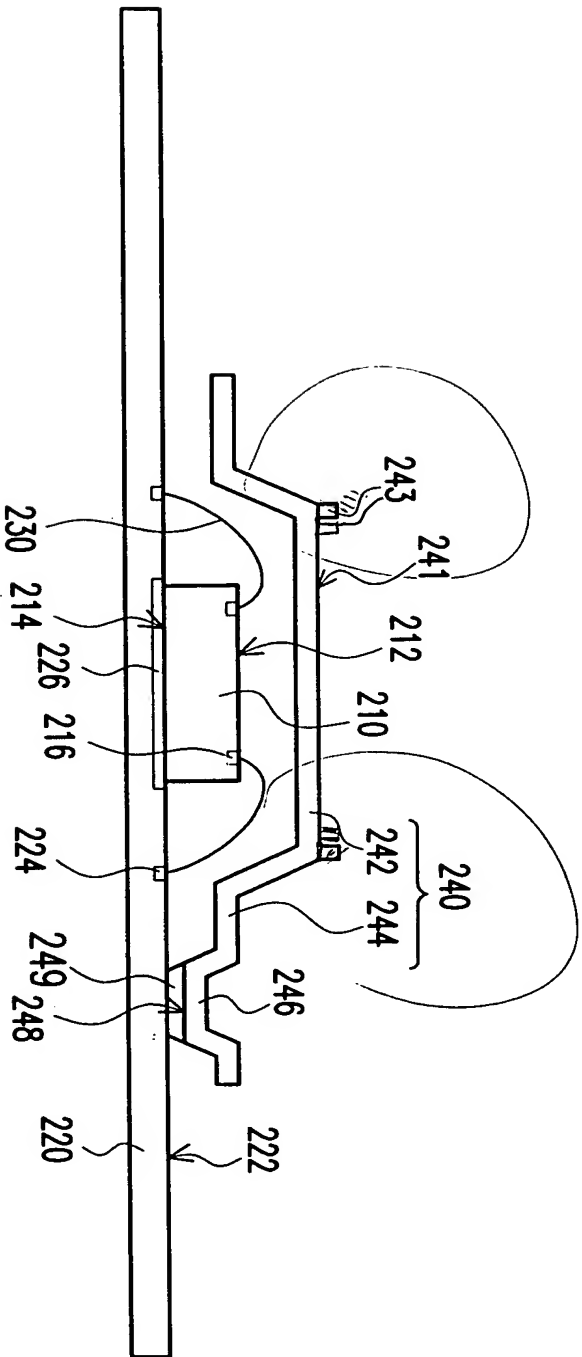


FIG. 5

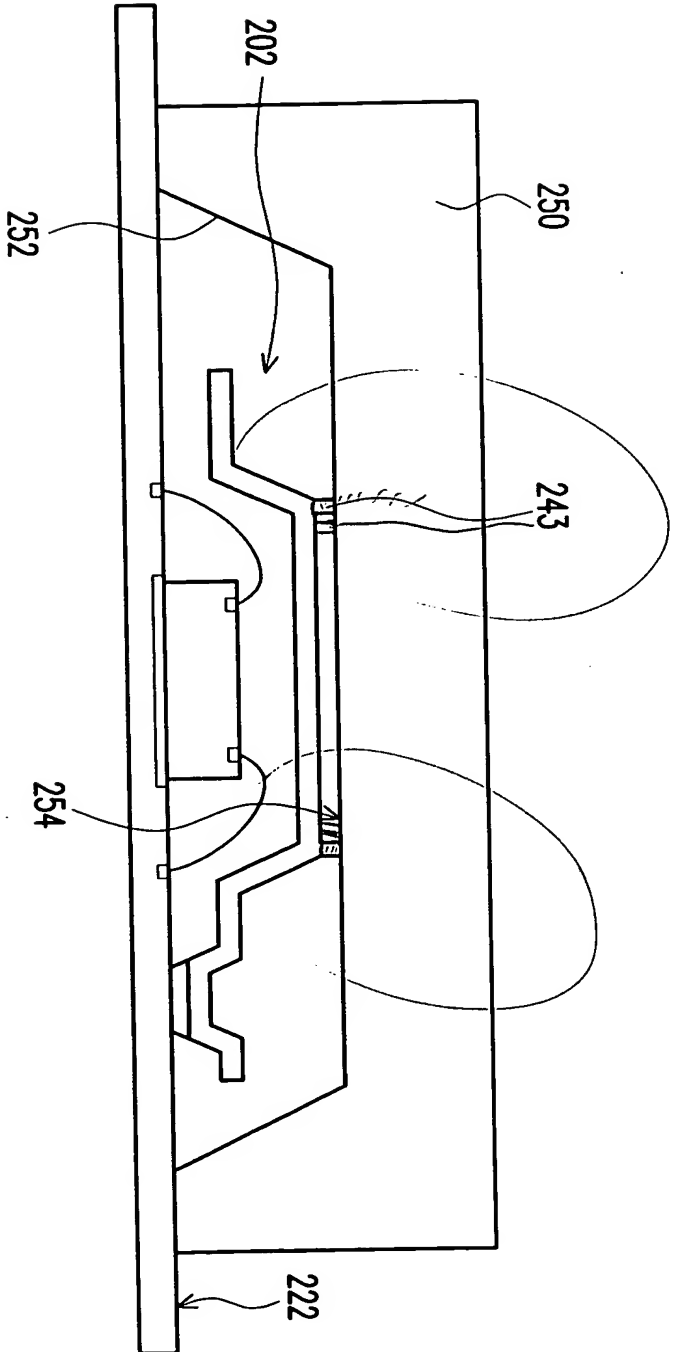


FIG. 6

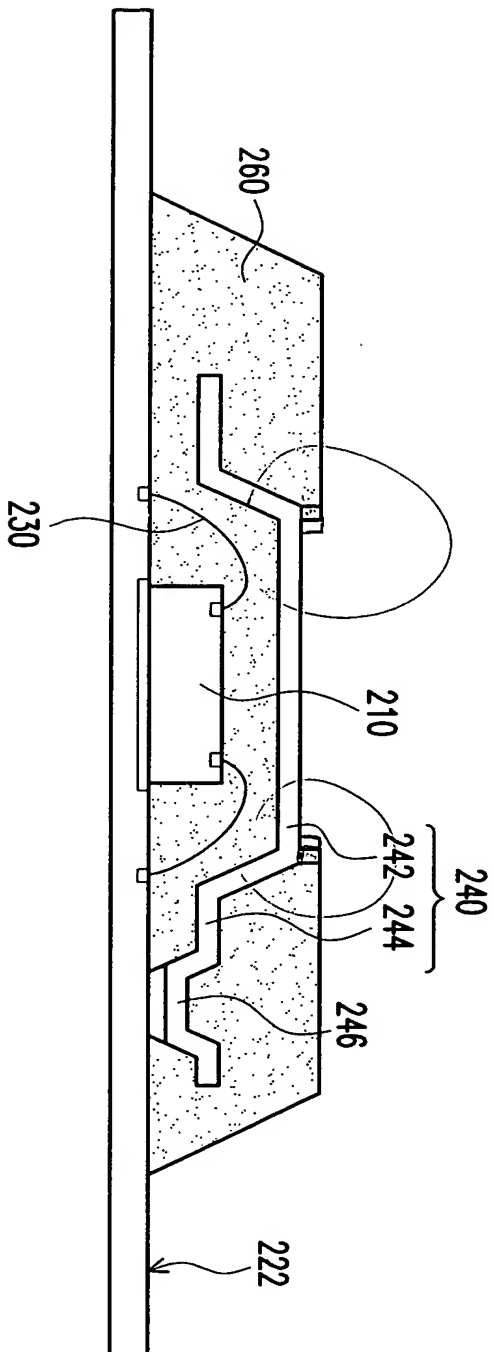


FIG. 7